APRIL 14, 2007

NOAA SECTORAL APPLICATIONS RESEARCH PROGRAM (SARP)
PROJECT ANNUAL REPORT

PROJECT TITLE

Improved Water Resources Management in the Sahel-Sudan, a Case Study of Burkina Faso

INVESTIGATORS
(Research team and full contact information)

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PROJECT YEARS JUNE 1, 2006 TO MAY 31, 2008

TIME PERIOD ADDRESSED BY REPORT *(e.g., August 2002-March 2003)*
6/1/06 - 2/28/07

I. Preliminary Materials

A Project Abstract *(Limit to one page)*

The Sahel-Sudan climatic zone south of the Sahara Desert is characterized by a strong north-south gradient of seasonal (summer) rainfall varying from 100 mm annual rainfall in the extreme north to over 1000 mm in the extreme south. The region's rainfall is characterized by extreme seasonal and annual temporal and spatial variability. The major livelihood activity in Burkina Faso is rainfed cultivation of cereal crops with limited cultivation of rice, peanut, and cowpea. Cotton is the dominant export crop and is mostly grown in the southwest. Livestock management is an important complement to farm activities, especially in the Sahelian zone. There are several major rivers flowing through the region and many ephemeral streams flowing only during the wet season. Surface water resources are becoming more important to Burkina Faso as it tries to improve food security and water supplies, and increase energy production. There are at least four significant irrigation schemes; Comoe Basin in the southwest, Sourou Valley in the northwest, and Bagre and Kompienga in the southeast. The overall **objective** of this project is to identify and test constraints and opportunities, both at the institutional level and at the community level, for utilizing seasonal climate forecasts to improve irrigation surface water management in Burkina Faso as an example of possible water management improvements in the Sahel-Sudan. Our proposed research is to conduct a pilot project to deliver streamflow forecasts and build an associated reservoir management decision support tool (DST) to improve irrigation water management in the case study area of the Comoe River Basin. Water supply users here include the sugar cane company SUSUCO, the town of Banfora, and the private farmers at Karfiguela and Tiefora. They are served by multiple large reservoirs. The research includes reviewing the state of the art of streamflow and rainfall forecasting for the area (rainfall is necessary because supplemental irrigation is used at some

B Objective of Research Project *(Limit to one paragraph)*

The overall objective of this project is to identify and test constraints and opportunities, both at the institutional level and at the community level, for utilizing seasonal climate forecasts to improve irrigation surface water management in Burkina Faso as an example of possible water management improvements in the Sahel-Sudan.

C Approach (including methodological framework, models used, theory developed and tested, project monitoring and evaluation criteria) include a description of the key beneficiaries of the anticipated findings of this project (e.g., decision makers in a particular sector/level of government, researchers, private sector, science and resource management agencies) *(Limit to one page)*

Task 1: Reconnaissance of Comoé River *(January 2007).* The U.S.-based team and its Burkina Faso partners will travel to the Comoé Basin to learn about the water management system, its operation, and stakeholder uses. This task was completed with two field visits, in December 2006 and in January 2007.

Task 2: Reviewing the State of the Art in Seasonal Rainfall and Streamflow Forecasting in the Region and Initial Prediction Tool Implementation and Evaluation *(June 2007- June 2008).* A review the state of art of seasonal rainfall and streamflow forecasting in the region will be completed at the onset of the project. The review will emphasize the probable needs of water resource management in the watershed. Needs may include forecasts of precipitation for the wet season, forecasts of streamflow for the year, and translation of these into ensemble traces of sub-seasonal rainfall and streamflow applying temporal and spatial downscaling techniques. Methods for updating the forecast information during the season will be explored.

Task 3: Reviewing and Assembling Hydrologic, Meteorological, and Hydraulic Data *(January 2007- April 2007).* An assessment of technical data needs for the DST will be conducted and the necessary data will be compiled in electronic formats by the Burkina Faso partners and provided to the U.S. based team that is building the DST.

Task 4: Identifying Stakeholders, Information Needs, Communication Flows, Potential Uses and Impacts of Forecast Information *(January 2007- January 2008).* A rapid stakeholder assessment will be conducted to identify stakeholders, decision making processes, and understand the social and institutional context. Further field research based on interviews with users and decision makers will capture the linkages between resource management decisions and potential impacts of the DST.

Task 5: Review of Environmental and Public Health Issues *(January 2007- November 2007).* A preliminary review of environmental and public health issues possibly related to the operation of the reservoirs and irrigation system will be conducted.

Task 6: Preliminary Design of Decision Support Tool *(January 2007 – January 2008).* Using the results of the previous tasks, a preliminary version of the DST will be developed and discussed with stakeholders in January 2008 and appropriate adjustments made in the DST design. Stakeholder feedback will also be elicited on the DST presentation format and communication mechanisms.

Task 7: Implementing Pilot Project *(January 2008-January 2009).* Based on the results of Task 6, the DST will be built and tested by using hindcasting to show how the DST would have worked in past recent years. The DST will be implemented at the project site by January 2009. The results of the hindcasting will show users how the DST would have worked in past recent years and help demonstrate the strengths and weaknesses of the DST. Training will be provided to the stakeholders and all project partners on how to use the tools. It is recognized that sustainable reservoir management requires adaptive learning and that this study will provide an opportunity for learning rather than a fixed formula for management. The U.S.-based team will provide remote technical support to the stakeholders and to Burkina Faso partner institutions in their use of the DST in the year following project completion. This will also provide evaluation of the tool.

Beneficiaries of the project will include both corporate and private farmers, the town of Banfora (its water supply comes from the reservoirs), researchers and managers at our Burkinabe partners, and researchers on climate variability and risk throughout the world. In addition, it will be an example for similar water users in West Africa, where due to unpredictable climate and increased pressure on water resources, they are building and planning more dams

D Description of any matching funds/activities used in this project *(Limit to one paragraph)*

None

II. ACCOMPLISHMENTS

A. Brief discussion of project timeline and tasks accomplished. Include a discussion of data collected, models developed or augmented, fieldwork undertaken, or analysis and/or evaluation undertaken, workshops held, training or other capacity building activities implemented. *(This can be submitted in bullet form – limit to two pages)*

Results per task are below.

Task 1: Reconnaissance of Comoé River *(January 2007)*
The Tufts and UGA toured the basin with DM, INERA, and DGRE partners in early January 2007 and met with dam owners and water users. .

Task 2: Reviewing the State of the Art in Seasonal Rainfall and Streamflow Forecasting in the Region and Initial Prediction Tool Implementation and Evaluation *(June 2007- June 2008)* This task has not started yet.

Task 3: Reviewing and Assembling Hydrologic, Meteorological, and Hydraulic Data *(January 2007- April 2007).* Based upon Task 1, arrangements were made with our partners to assemble the data necessary for the model. Much has been received.

Task 4: Identifying Stakeholders, Information Needs, Communication Flows, Potential Uses and Impacts of Forecast Information *(January 2007- January 2008).* A first phase of this was completed in January. The entire team met with initially with stakeholders in the Comoe River Basin and then Dr Roncoli returned for more detailed interviews. More interaction is planned in January 2008.

Task 5: Review of Environmental and Public Health Issues *(January 2007- November 2007).* It was decided that these were be important and plans were made to include them in the research.

Task 6: Preliminary Design of Decision Support Tool *(January 2007 – January 2008).* Using the results of the previous tasks, a preliminary version of the DST will be developed and discussed with stakeholders in January 2008. A concept model will be discussed with users in Summer 2007; construction is underway.

Task 7: Implementing Pilot Project *(January 2008-January 2009).* Not started yet.

B. Summary of findings, including their potential or actual implications for efforts to develop applications, methods, and science-based decision support capacity/systems and to foster sustainable resource management and vulnerability reduction. *(Limit to two pages)*

Water resources in the basin are subject to multiple uses and claims by 3 sets of stakeholders: a) a private sugar company (SOSUCO), which uses the water for sugar cane irrigation and sugar production, and which owns and manages the dams and the main distribution systems; b) the public utility company (ONEA) that provides water to the town of Banfora; c) small scale farmers downstream from the reservoirs, some of whom are organized into cooperatives such as in the Karfiguela area; d) a commercial plantation that draws water from the Comoé river (but has problems securing enough water during the hottest months of March and April); e) resident and transient pastoralists whose livestock must access water for drinking. Even during favorable rainfall years, there is not enough water to meet the needs of all water users – thus a DST based upon rainfall and precipitation forecasting will be useful. It will even more so when rainfall is below average, as it has been the case in recent years. During such times conflicts over water resources intensify.

A preliminary stakeholder assessment during January 2008 included interviews with 20 farmers, 3 farmer cooperatives (focus groups), 10 representatives of government agencies

C. List of any reports, papers, publications or presentations arising from this project; please send any reprints of journal articles as they appear in the literature. Indicate whether a paper is formally reviewed and published. *(No text limit)*

None yet

D. Discussion of any significant deviations from proposed workplan (e.g., shift in priorities following consultation with program manager, delayed fieldwork due to late arrival of funds, obstacles encountered during the course of the project that have impacted outcome delivery). *(Limit to one paragraph)*

Since we could not get to field until January 2007, and once we did, we realized that more time will be needed to thoroughly complete the research, the project will have to be extended to December 31, 2008. This will be done with a no-cost extension application. Also, having met with the Burkinabe project partners and visited the site, the project workplan has been slightly altered from that in the proposal. The same research, however, will be accomplished. We have excellent cooperative arrangements with DGRE, INERA, and DM.

E. Where appropriate, describe the climate information products and forecasts considered in your project (both NOAA and non-NOAA); identify any specific feedback on the NOAA products that might be helpful for improvement (bulleted response)

The detailed forecast approach is still being decided by the project team. Presently because we need fine spatial and temporal detail, we are proposing to use multiple GCMs and down-scale them.

III. GRAPHICS: PLEASE INCLUDE THE FOLLOWING GRAPHICS AS ATTACHMENTS TO YOUR REPORT

A. One Power point slide depicting the overall project framework/approach/results to date

Attached.

B. If appropriate, additional graphic(s) or presentation(s) depicting any key research results thus far

C. Photographs (if easy to obtain) from fieldwork to depict study information (if applicable).

Attached to Power Point Slide

IV. WEBSITE ADDRESS FOR FURTHER INFORMATION (IF APPLICABLE)

Not applicable

V. ADDITIONAL RELEVANT INFORMATION NOT COVERED UNDER THE ABOVE CATEGORIES.

We will be meeting again with Burkinabe project partners during a RANET workshop in Burkina Faso in Summer 2007.